

What is claimed is:

1           1.       A method of determining a configuration of a well, comprising:  
2                    receiving, at a first module executable in a system, input data relating to  
3 characteristics of a reservoir and a well surface arrangement; and  
4                    selecting, by the first module based on the input data, a trajectory of a  
5 wellbore in the well, a type of interface between the reservoir and the wellbore, and  
6 completion equipment for installation in the wellbore.

1           2.       The method of claim 1, further comprising displaying an output  
2 representing the selected wellbore trajectory, type of interface, and completion equipment  
3 in a user interface of the system.

1           3.       The method of claim 1, further comprising determining, by the first  
2 module based on the input data, if the well is to be a multilateral well.

1           4.       The method of claim 3, wherein determining if the well is to be a  
2 multilateral well comprises determining a type of multilateral well based on one or more  
3 of the following factors: the reservoir is mature, flooded, or depleted; a platform has slot  
4 constraints; the well has a high-pressure, high-temperature region; the well has a  
5 naturally fractured reservoir; the well has a reservoir with heavy oil; the reservoir is a  
6 layered reservoir; the reservoir permeability; and the thickness of the reservoir.

1           5.       The method of claim 1, wherein receiving input data relating to the  
2 characteristics of the reservoir comprises receiving data relating to one or more of the  
3 following: a geometry of the reservoir; if the reservoir is fractured; if the reservoir  
4 contains heavy oil; a permeability of the reservoir; a vertical permeability to horizontal  
5 permeability ratio in the reservoir; a variation of the permeability in the reservoir; and a  
6 drive mechanism of the reservoir.

1           6.     The method of claim 5, wherein receiving input data relating to the well  
2 surface arrangement comprises receiving an indication of whether the well surface  
3 arrangement is a land well, an offshore well with a surface platform, or a subsea well.

1           7.     The method of claim 6, wherein selecting the well trajectory comprises  
2 selecting one of a vertical well, a slant well, and a horizontal well.

1           8.     The method of claim 5, wherein selecting the type of interface between the  
2 reservoir and wellbore comprises selecting one of an open hole completion, a cased hole  
3 completion, and a slotted liner completion.

1           9.     The method of claim 8, further comprising receiving input data relating to  
2 whether a formation containing the reservoir is a sandstone formation or a carbonate  
3 formation,  
4                 wherein selecting the type of interface is further based on receiving the  
5 input data relating to the formation.

1           10.    The method of claim 1, wherein selecting the completion equipment  
2 comprises selecting an arrangement of a lower completion in the well.

1           11.    The method of claim 10, wherein selecting the arrangement of the lower  
2 completion comprises selecting a type of sand control arrangement.

1           12.    The method of claim 1, wherein selecting the completion equipment  
2 comprises selecting a type of artificial lift system.

1           13.    The method of claim 1, wherein selecting the completion equipment  
2 comprises selecting at least one of a flow control device and a sensor.

1           14.     The method of claim 1, further comprising refining a proposed  
2 configuration generated by the first module, the proposed configuration comprising the  
3 well trajectory, the reservoir-wellbore interface, and the completion equipment.

1           15.     The method of claim 14, wherein refining the proposed configuration  
2 comprises one or more of the following: determining placement of the well with the  
3 proposed well trajectory in the reservoir; determining placement of perforations; and  
4 determining a position of completion equipment.

1           16.     The method of claim 15, wherein refining the proposed configuration is  
2 based on a predefined performance measure.

1           17.     The method of claim 16, wherein refining the proposed configuration is  
2 based on a constraint selected from the group consisting of a target production rate, a  
3 target gas-to-oil ratio, and a target bottom-hole pressure.

1           18.     The method of claim 16, wherein refining the proposed configuration  
2 comprises invoking a simulator to assess performance of the proposed configuration.

1           19.     The method of claim 18, wherein refining the proposed configuration  
2 comprises invoking an economics tool to determine effect of the proposed configuration  
3 on a predefined economic measure.

1           20.     An article comprising at least one storage medium containing instructions  
2     for determining a configuration of a well, the instructions when executed causing a  
3     system to:

4                 receive input data relating to characteristics of a reservoir and a well  
5     surface arrangement; and

6                 generate a proposed configuration of the well using a rule-based analysis,  
7     the proposed configuration including a trajectory of a wellbore in the well, a type of  
8     interface between the reservoir and the wellbore, and completion equipment for  
9     installation in the wellbore based on the input data.

1           21.     The article of claim 20, wherein the instructions when executed cause the  
2     system to further determine, based on the input data, if the well is to be a multilateral  
3     well.

1           22.     The article of claim 20, wherein the instructions when executed cause the  
2     system to receive the input data relating to the characteristics of the reservoir by receiving  
3     data relating to one or more of the following: a geometry of the reservoir; if the reservoir  
4     is fractured; if the reservoir contains heavy oil; a permeability of the reservoir; a vertical  
5     permeability to horizontal permeability ratio in the reservoir; a variation of the  
6     permeability in the reservoir; and a drive mechanism of the reservoir.

1           23.     The article of claim 22, wherein the instructions when executed cause the  
2     system to receive input data relating to the well surface arrangement by receiving an  
3     indication of whether the well surface arrangement is a land well, an offshore well with a  
4     surface platform, or a subsea well.

1           24.     The article of claim 20, wherein the instructions when executed cause the  
2     system to generate the proposed configuration by selecting an arrangement of a lower  
3     completion in the well.

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1           25.    The article of claim 24, wherein the instructions when executed cause the  
2 system to generate the proposed configuration by further selecting a type of sand control  
3 arrangement.

1           26.    The article of claim 20, wherein the instructions when executed cause the  
2 system to generate the proposed configuration by selecting a type of artificial lift system.

1           27.    The article of claim 20, wherein the instructions when executed cause the  
2 system to generate the proposed configuration by selecting at least one of a flow control  
3 device and a sensor.

1           28.    The article of claim 20, wherein the instructions when executed cause the  
2 system to further refine the proposed configuration.

1           29.    The article of claim 28, wherein the instructions when executed cause the  
2 system to refine the proposed configuration by performing one or more of the following:  
3 identify a placement of the well with the proposed well trajectory in the reservoir;  
4 identify a placement of perforations; and identify a position of completion equipment.

1           30.    The article of claim 29, wherein the instructions when executed cause the  
2 system to refine the proposed configuration based on a predefined performance measure.

1           31.    The article of claim 30, wherein the instructions when executed cause the  
2 system to further invoke a simulator to assess performance of the proposed configuration  
3 in refining the proposed configuration.

1           32.    A system comprising:  
2                   a processor; and  
3                   one or more modules executable on the processor to receive input data  
4 relating to characteristics of a reservoir and a well surface arrangement,  
5                   the one or more modules executable to further generate a proposed  
6 configuration of the well, the proposed configuration including a trajectory of a wellbore  
7 in the well, a type of interface between the reservoir and the wellbore, and completion  
8 equipment for installation in the wellbore based on the input data.

1           33.    The system of claim 32, further comprising an optimizer module  
2 executable on the processor to refine the proposed configuration based on a performance  
3 measure.

1           34.    The system of claim 33, further comprising a simulator executable on the  
2 processor, the optimizer module to invoke the simulator to determine effect of the  
3 proposed configuration on the performance measure.

1           35.    The system of claim 32, further comprising a storage containing case  
2 histories of installed completions in respective wells, the one or more modules to access  
3 the case histories in generating the proposed configuration.